Quick Start Guide:
Emerson FB2200 Flow Computer

Remote Automation Solutions

EMERSON

Device Safety Considerations

- Reading these Instructions
  Before operating the device, read these instructions carefully and understand their safety implications. In some situations, improperly using this device may result in damage or injury. Keep this manual in a convenient location for future reference. Note that these instructions may not cover all details or variations in equipment or cover every possible situation regarding installation, operation, or maintenance. Should problems arise that are not covered sufficiently in the text, immediately contact Customer Support for further information.
- Protecting Operating Processes
  A failure of this device – for whatever reason -- may leave an operating process without appropriate protection and could result in possible damage to property or injury to persons. To protect against this, you should review the need for additional backup equipment or provide alternate means of protection (such as alarm devices, output limiting, fail-safe valves, relief valves, emergency shutoffs, emergency switches, etc.). Contact Remote Automation Solutions for additional information.
- Returning Equipment
  If you need to return any equipment to Remote Automation Solutions, it is your responsibility to ensure that the equipment has been cleaned to safe levels, as defined and/or determined by applicable federal, state and/or local law regulations or codes. You also agree to indemnify Remote Automation Solutions and hold Remote Automation Solutions harmless from any liability or damage which Remote Automation Solutions may incur or suffer due to your failure to ensure device cleanliness.
- Grounding Equipment
  Ground metal enclosures and exposed metal parts of electrical instruments in accordance with OSHA rules and regulations as specified in *Design Safety Standards for Electrical Systems*, 29 CFR, Part 1910, Subpart S, dated: April 16, 1981 (OSHA rulings are in agreement with the National Electrical Code). You must also ground mechanical or pneumatic instruments that include electrically operated devices such as lights, switches, relays, alarms, or chart drives.
- Protecting from Electrostatic Discharge (ESD)
  This device contains sensitive electronic components which be damaged by exposure to an ESD voltage. Depending on the magnitude and duration of the ESD, it can result in erratic operation or complete failure of the equipment. Ensure that you correctly care for and handle ESD-sensitive components.

System Training

A well-trained workforce is critical to the success of your operation. Knowing how to correctly install, configure, program, calibrate, and trouble-shoot your Emerson equipment provides your engineers and technicians with the skills and confidence to optimize your investment. Remote Automation Solutions offers a variety of ways for your personnel to acquire essential system expertise. Our full-time professional instructors can conduct classroom training at several of our corporate offices, at your site, or even at your regional Emerson office. You can also receive the same quality training via our live, interactive Emerson Virtual Classroom and save on travel costs. For our complete schedule and further information, contact the Remote Automation Solutions Training Department at 800-338-8158 or email us at *education@emerson.com*.

Safety First!

Never perform the installation/setup activities described in this document in a hazardous area. Ensure the area is non-hazardous.

⚠ DANGER

EXPLOSION HAZARD: Never remove cover(s) in a hazardous location. Removing cover(s) in a hazardous location could result in an explosion.

⚠ DANGER

EXPLOSION HAZARD: Ensure the area in which you perform this operation is non-hazardous. Performing this operation in a hazardous area could result in an explosion.

Important

Only use batteries supplied with the flow computer or sold by Emerson as spare parts for this flow computer. If you substitute a battery you obtain elsewhere you will void your certification unless it is the identical part from the same manufacturer as that supplied with the flow computer from Emerson.

Important

If you purchase a solar panel/external solar regulator combination other than the Emerson-approved option, it must meet the specifications listed in the FB2200 instruction manual.

⚠ DANGER

EXPLOSION HAZARD - Substitution of any components may impair suitability for Class I, Division 2.

⚠ DANGER

EXPLOSION HAZARD - Do not disconnect equipment unless power has been removed or the area is known to be non-hazardous.

Tools Required

Certain tools and equipment are required for installing and servicing the flow computer.

Table 1: Required Tools

Tools:	Usage:
Torque wrench	For bolting/mounting the flow computer
2.5 mm Hexagonal wrench	For manipulating rotation set screw
High-wattage soldering iron and solder	For tinning ground connection wire
#1 Phillips-head screwdriver	For screws on HMI module
#2 Phillips-head screwdriver	For screws on other modules and boards
#3 Phillips-head screwdriver	For optional aluminum enclosure clamps
1/8 inch flat-head screwdriver	For 5.08 mm pitch terminal block connections
Utility knife	For 30W solar panel installation
Wire strippers	For 30W solar panel installation
Wire cutters	For 30W solar panel installation
7/32 inch flat-head screwdriver	For 30W solar panel installation
Laptop PC running Field Tools with FBxConnect configuration software	For software configuration

Opening/Closing the Enclosure

The enclosure opens/closes differently, depending upon whether you have the compression-molded fiberglass enclosure or the aluminum enclosure.

⚠ DANGER

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- Compression-molded Fiberglass Enclosure

  The enclosure includes two fasteners at the top and bottom of the door. To open the door, lift the clasp to loosen the latch and pull it free of the post, then repeat for the other fastener and open the door. To fasten the door, place the latch on the post and press down the clasp; repeat for the other fastener.

- Aluminum Enclosure

  The enclosure includes six clamps along the edge of the door (two at the top, two on the bottom, two at the side). To open the door, use a Phillips-head screwdriver to loosen (but not remove) the screws enough so you can then pop the clamp free of the lip of the door, then repeat for the other clamps and open the door. To fasten the door, place the clamp over the door lip then tighten the screw; repeat for the other clamps.

Bolting Considerations

⚠ DANGER

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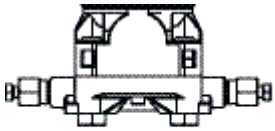
If the flow computer installation requires assembly of a process flange, manifold, or flange adapters, follow these assembly guidelines to ensure a tight seal for optimal performance characteristics of the flow computer.

Only use bolts supplied with the flow computer or sold by Emerson as spare parts. Refer to the figure below for common flow computer assemblies with the bolt length required for proper flow computer installation. Bolt thread size is 7/16-20 UNF.

Note
For all other manifolds, contact your Emerson Local Business Partner (LBP).

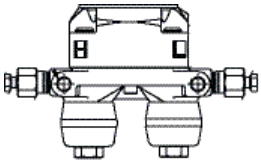
Bolts are typically carbon steel or stainless steel. Confirm the material by viewing the markings on the head of the bolt and referencing *Table 2*. If bolt material is not shown in the table, contact your local Emerson representative for more information.

Transmitter with coplanar flange



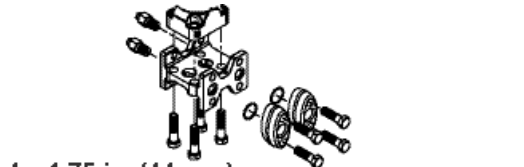
4 x 1.75 in (44 mm)

Transmitter with coplanar flange and optional flange adapters



4 X 2.88 in (73 mm)

Transmitter with coplanar flange and optional flange adapters



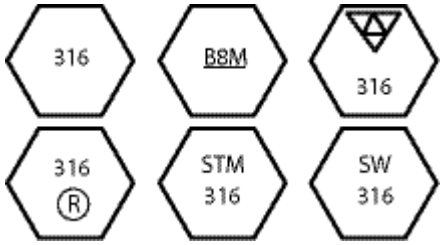
4 x 1.75 in (44 mm)

4 x 1.50 in (38 mm)

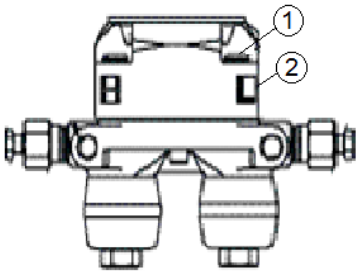
Use the following bolt installation procedure:

1. Carbon steel bolts do not require lubrication. Stainless steel bolts are factory-coated with a lubricant to ease installation. Do not apply any additional lubricant when installing either type of bolt.
2. Finger-tighten the bolts.
3. Torque the bolts to the **initial** torque value using a crossing pattern. See *Table 2* for initial torque value.
4. Torque the bolts to the **final** torque value using the same crossing pattern. See *Table 2* for final torque value.
5. Verify that the flange bolts protrude through the sensor module before applying pressure.

Table 2: Torque Values for the Flange and Flange Adapter Bolts

Bolt material	Head markings	Initial torque	Final torque
Carbon Steel (CS)		300 in. -lbs. (33.9 N m)	650 in. -lbs. (73.4 N m)
Stainless Steel (SST)		150 in. -lbs. (16.9 N m)	300 in. -lbs. (33.9 N m)

Proper Bolt Installation



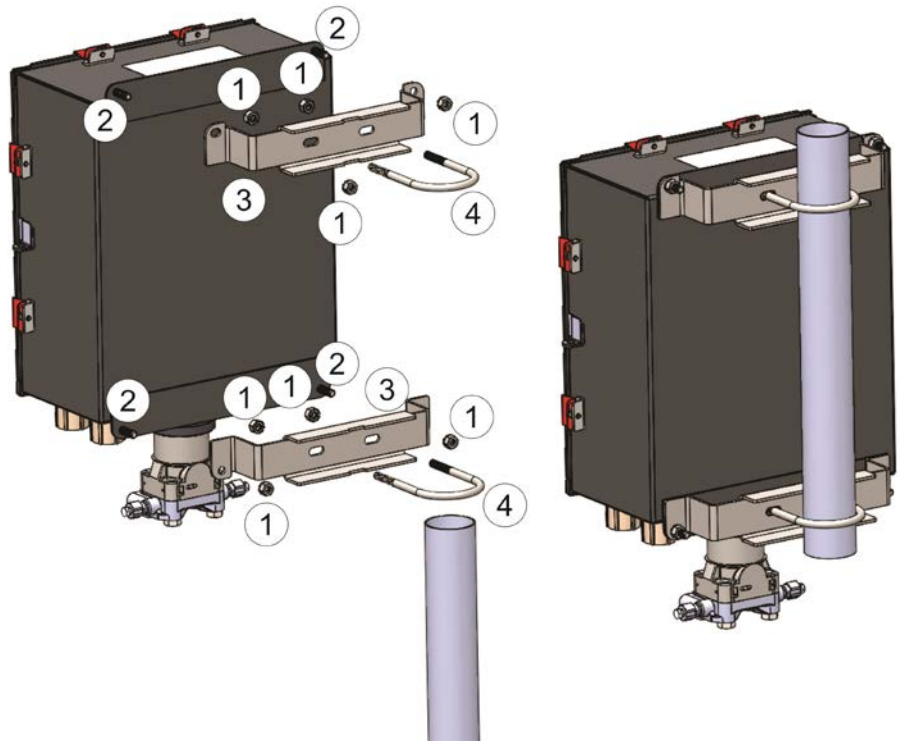
1 Bolt
2 Sensor module

Pole Mounting – Aluminum Enclosure

⚠ DANGER

EXPLOSION HAZARD: Ensure the area in which you perform this operation is non-hazardous. Performing this operation in a hazardous area could result in an explosion.

1. Apply Loctite® #222™ Low Strength Purple Threadlocker sparingly to threads of head cap screws (Item 2).
2. Attach pole mounting brackets (Item 3) to enclosure using head cap screws (Item 2) and hex nuts (Item 1). Torque hex nuts to 30 in-lbs (3.4 N m).
3. Apply Loctite #222 threadlocker sparingly to threads of U-bolts (Item 4).
4. Use U-bolts (Item 4) to mount enclosure to pole using hex nuts (Item 1). Torque hex nuts to 30 in-lbs (3.4 N m).



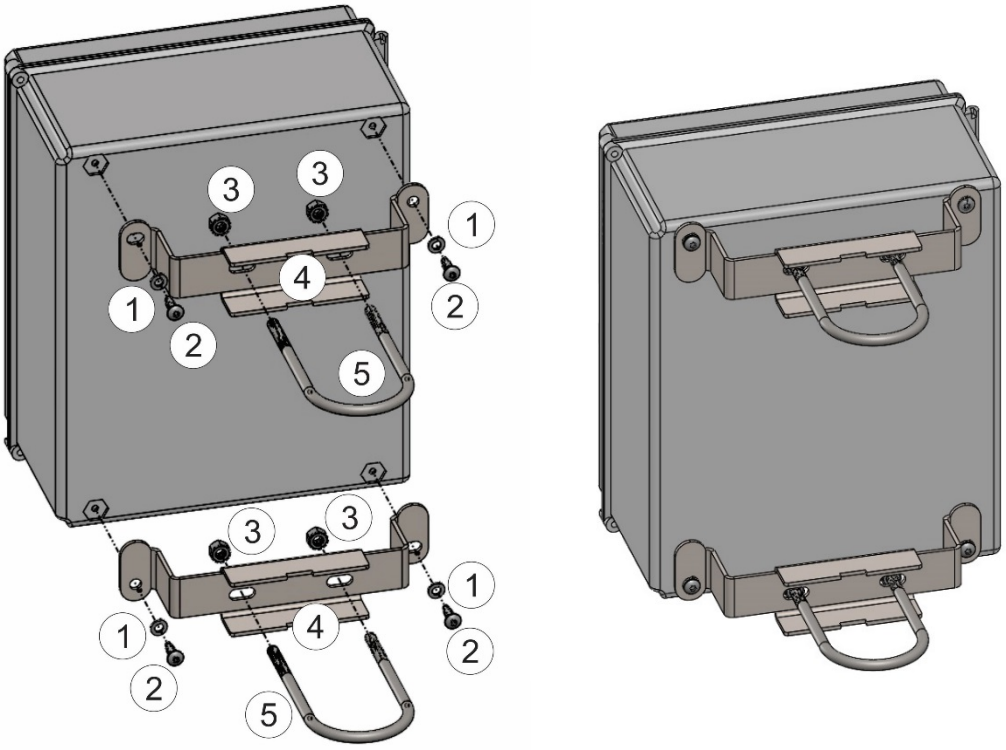
1	5/16-18 keps stainless steel hex nut
2	5/16-18 x 1.0 LG wire-lockable socket head cap screw
3	Pole mounting bracket
4	2-inch diameter 5/16-18 x 4.0LG U-bolt

Pole Mounting –Fiberglass Enclosure

⚠ DANGER

EXPLOSION HAZARD: Ensure the area in which you perform this operation is non-hazardous. Performing this operation in a hazardous area could result in an explosion.

1. Attach pole mounting brackets (Item 4) to enclosure using split lock stainless steel washers (Item 1) and torx head screws (Item 2).
2. Apply Loctite® #222 Low Strength Purple Threadlocker adhesive sparingly to threads of U-bolts (Item 5).
3. Use U-bolts (Item 5) to mount enclosure to pole using hex nuts (Item 3). Torque hex nuts to 30 in-lbs (3.4 N m).



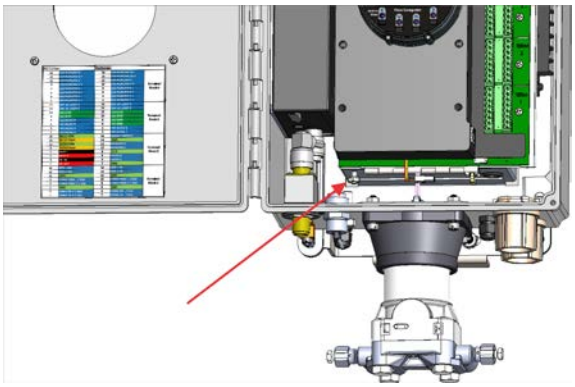
1	¼ inch screw split lock stainless steel washer
2	¼-10 x .75LG thread forming torx head screw
3	5/16-18 keps stainless steel hex nut
4	pole mounting bracket
5	2 inch diameter 5/16-18 x 4.0LG U-bolt

Grounding

⚠ DANGER

EXPLOSION HAZARD: Ensure the area in which you perform this operation is non-hazardous. Performing this operation in a hazardous area could result in an explosion.

The flow computer includes a ground stud on the bottom of the battery box enclosure.



- Once you have installed the unit, run a ground wire between the ground stud on the bottom of the battery box enclosure and a known good earth ground. You route the ground wire through one of the conduit fittings.
- Use stranded copper wire to earth ground, and keep the length as short as possible.
- Clamp or braze the ground wire to the ground bed conductor (typically a stranded copper AWG 0000 cable installed vertically or horizontally).
- Using a high-wattage soldering iron, tin the wire ends with solder before you insert them into the chassis ground lug.
- Run the ground wire so that any routing bend in the cable has a minimum radius of 30.48 cm (12 inches) below ground and 20.32 cm (8 inches) above ground.
- For more information on grounding or if your installation uses cathodic protection, refer to *Site Considerations for Equipment Installation, Grounding, and Wiring (D301452X012)*.

Communications Wiring

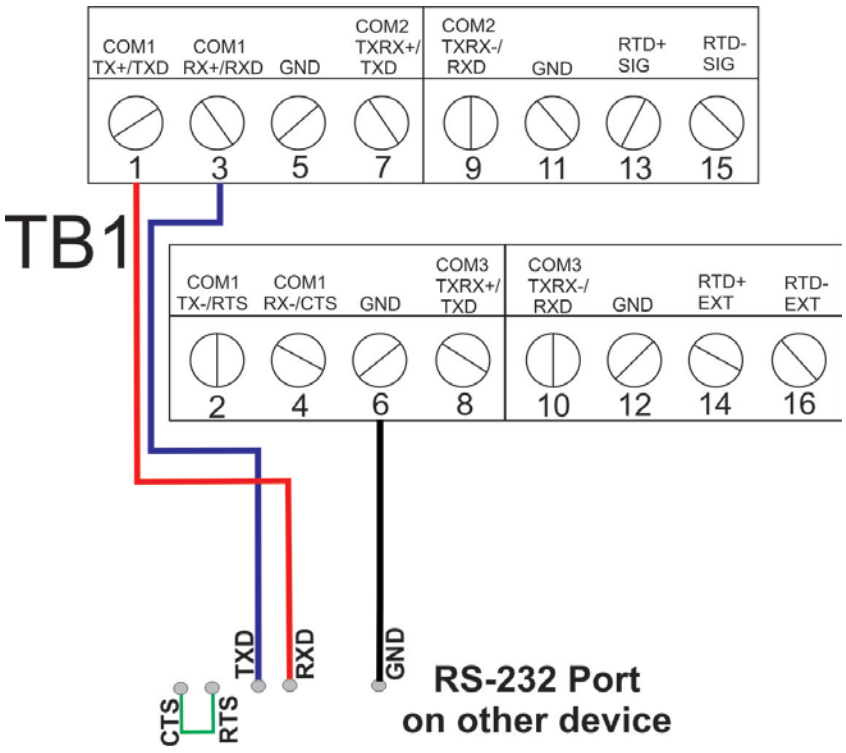
⚠ DANGER

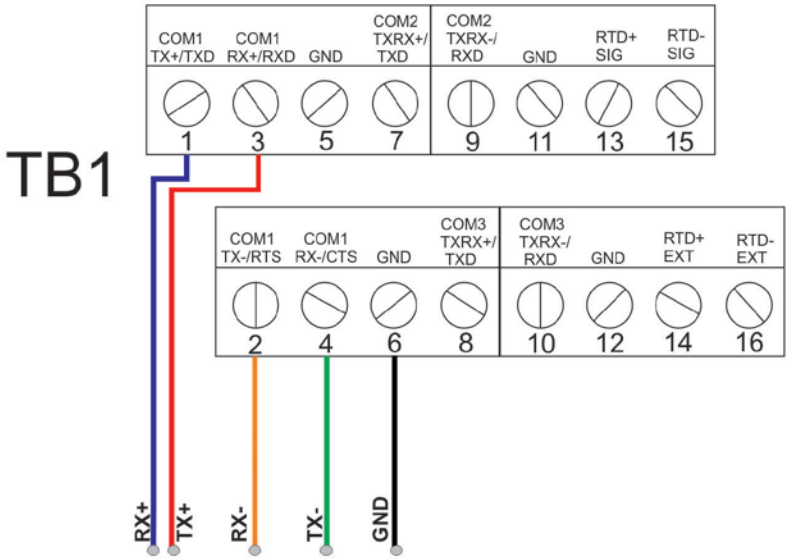
EXPLOSION HAZARD: Ensure the area in which you perform this operation is non-hazardous. Performing this operation in a hazardous area could result in an explosion.

Notes

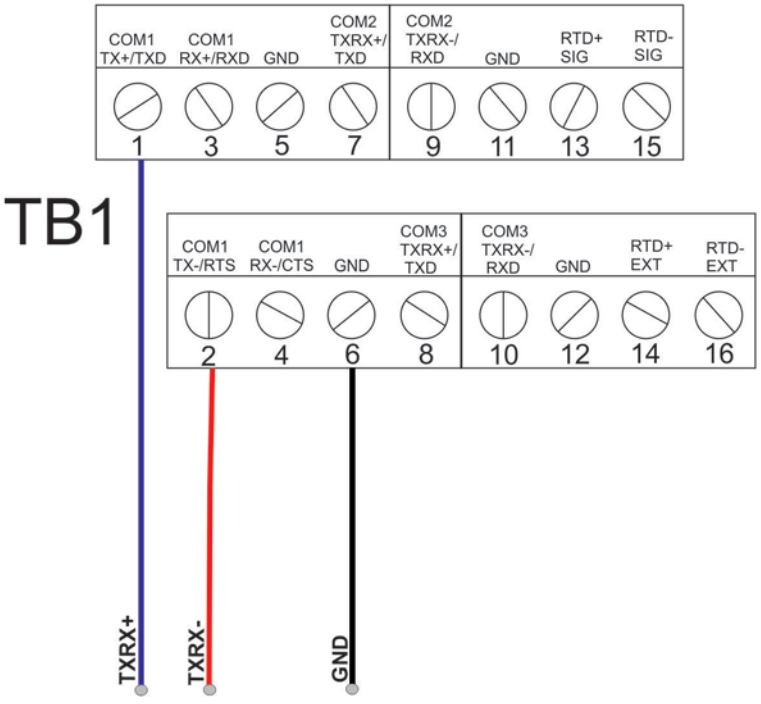
- You do not need to add termination resistors; you can configure termination through software selections in FBxConnect.
- You should terminate all shields at chassis ground.

- COM1



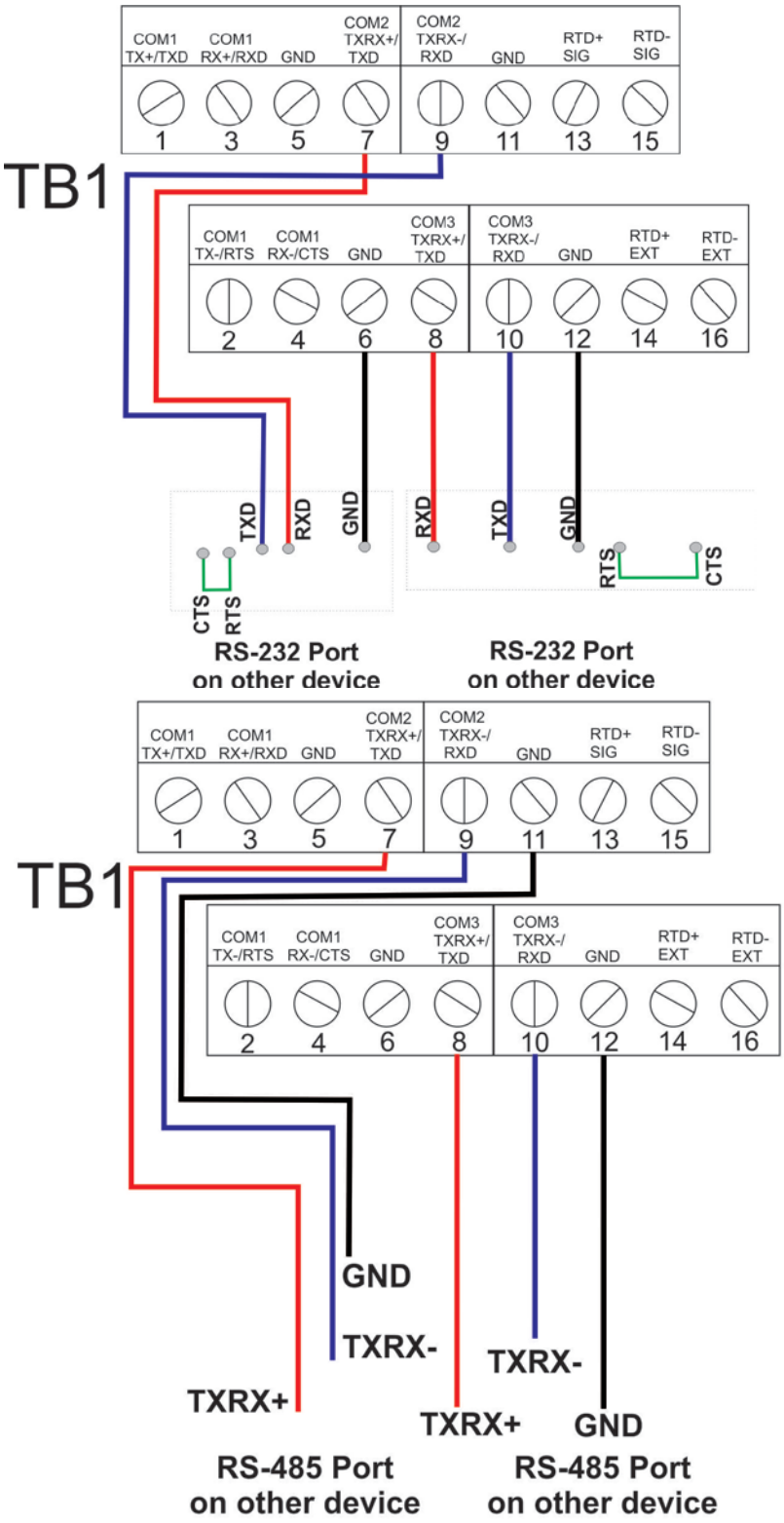


RS-422 Port on other device



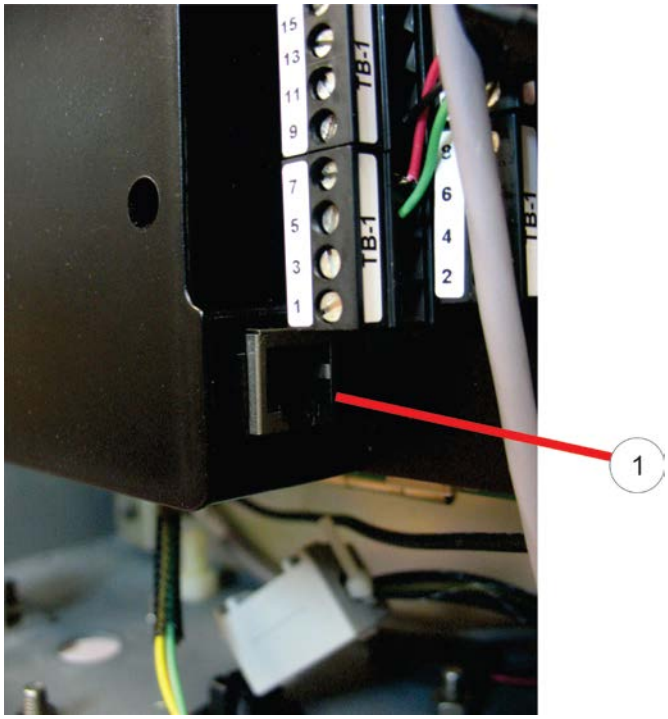
RS-485 Port on other device

COM2, COM3


TB1
COM1 TX+/TXD
COM1 RX+/RXD
GND
COM2 TXRX+/ TXD
COM2 TXRX-/ RXD
GND
RTD+ SIG
RTD- SIG
1
3
5
7
9
11
13
15
COM1 TX-/RTS
COM1 RX-/CTS
GND
COM3 TXRX+/ TXD
COM3 TXRX-/ RXD
GND
RTD+ EXT
RTD- EXT
2
4
6
8
10
12
14
16
TXD
RXD
GND
CTS
RTS
RXD
TXD
GND
RTS
CTS
RS-232 Port on other device
RS-232 Port on other device
TB1
GND
TXRX-
TXRX+
TXRX-
TXRX+
GND
RS-485 Port on other device
RS-485 Port on other device

- Ethernet

  The Ethernet port is a standard 8-pin 10/100Base-T RJ-45 modular connector located on the bottom right side of the CPU enclosure.



1 – Ethernet Port

Notes

- The default IP address for the port is 192.168.1.10.
- The default port is 20000 for DNP3 communication.
- A jumper enables/disables the Ethernet port – see the instruction manual for details.

I/O Wiring

⚠ DANGER

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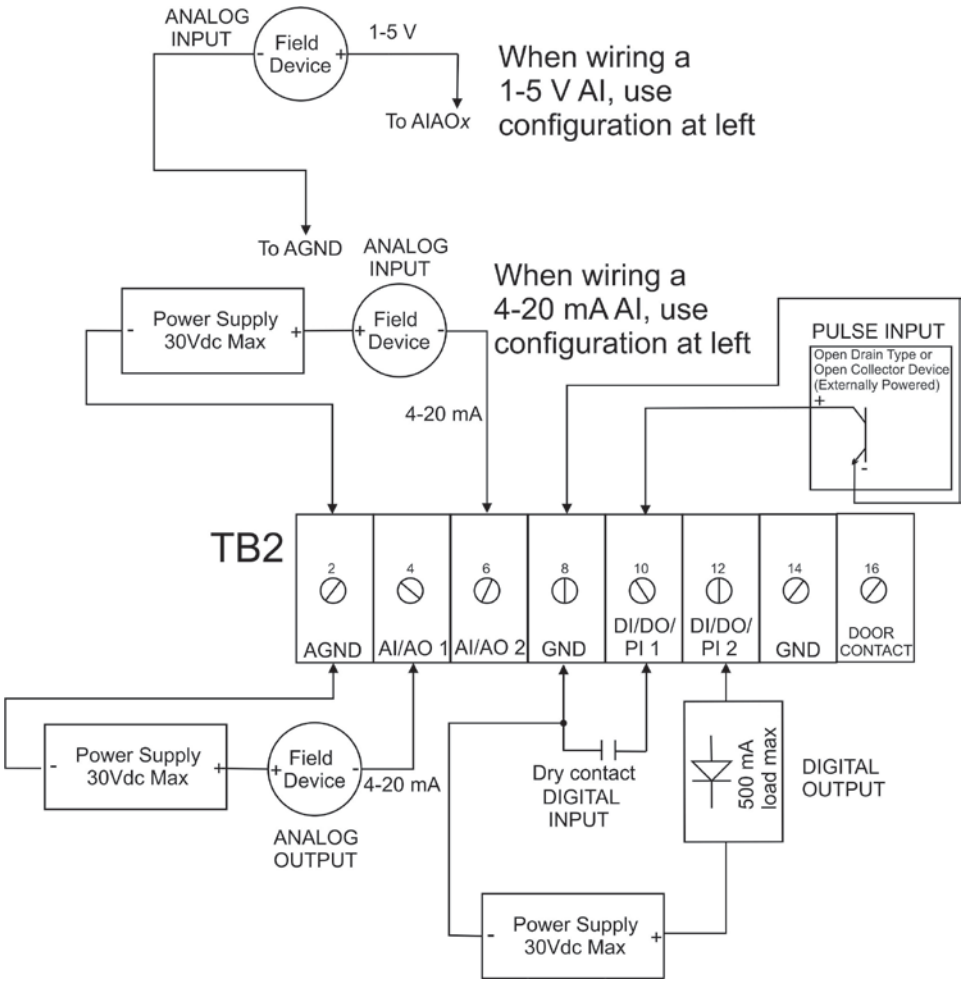
Note

You should terminate all shields at chassis ground.

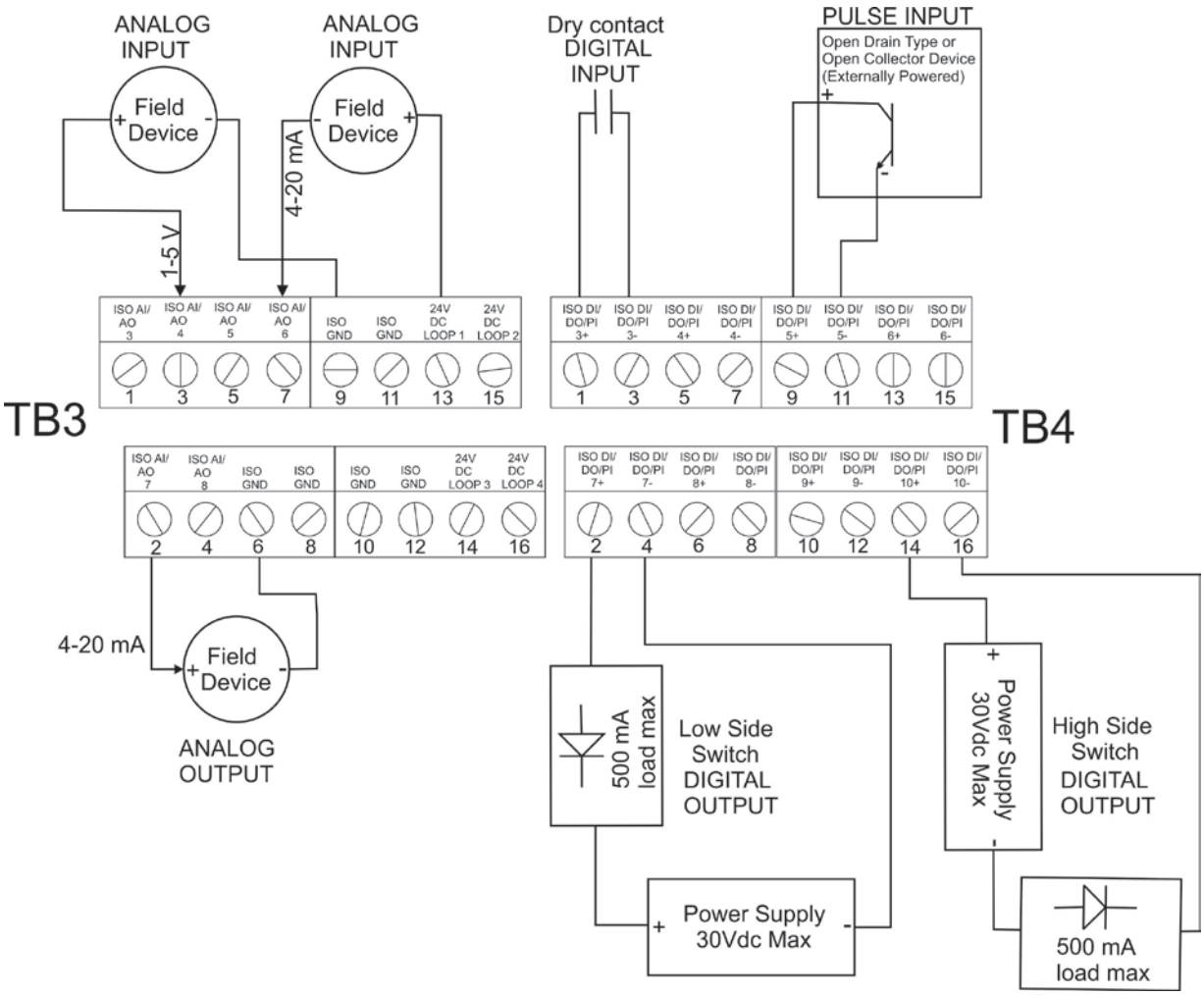
Note

When using a digital output to drive an inductive load (such as a relay coil), place a suppression diode across the load. This protects the DO from the reverse Electro-Motive Force (EMF) spike generated when the inductive load is switched off.

- CPU Base I/O (AI/AO1&2, DI/DO/PI 1&2) Wiring:



- Optional Expansion I/O Board Wiring:

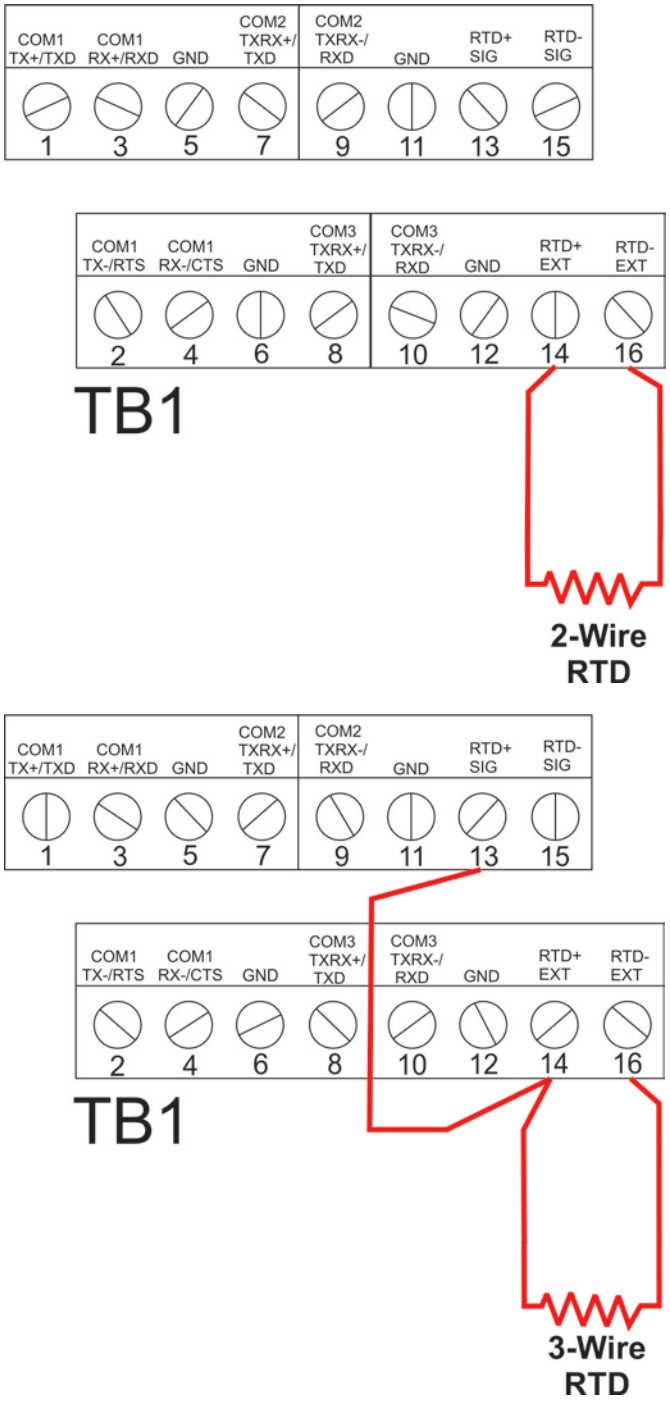


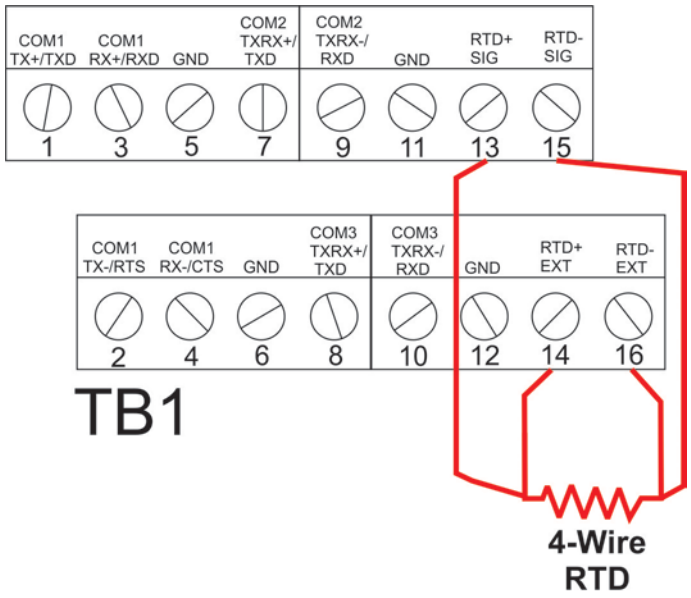
ISO AI/AO 7, 8 and ISO DI/DO/PI 7, 8, 9, 10 on 6-channel expansion I/O board only allowed if optional 8-channel expansion I/O board (ISO DI/DO/PI 3, 4, 5, 6, ISO AI/AO 3,4,5,6) already present.

- RTD Wiring:

Note

The default configuration is 4-wire RTD; you can change the configuration in FBxConnect.




COM1 TX+/TXD
COM1 RX+/RXD
GND
COM2 TXRX+/ TXD
COM2 TXRX-/ RXD
GND
RTD+ SIG
RTD- SIG
1
3
5
7
9
11
13
15
COM1 TX-/RTS
COM1 RX-/CTS
GND
COM3 TXRX+/ TXD
COM3 TXRX-/ RXD
GND
RTD+ EXT
RTD- EXT
2
4
6
8
10
12
14
16
TB1
4-Wire RTD

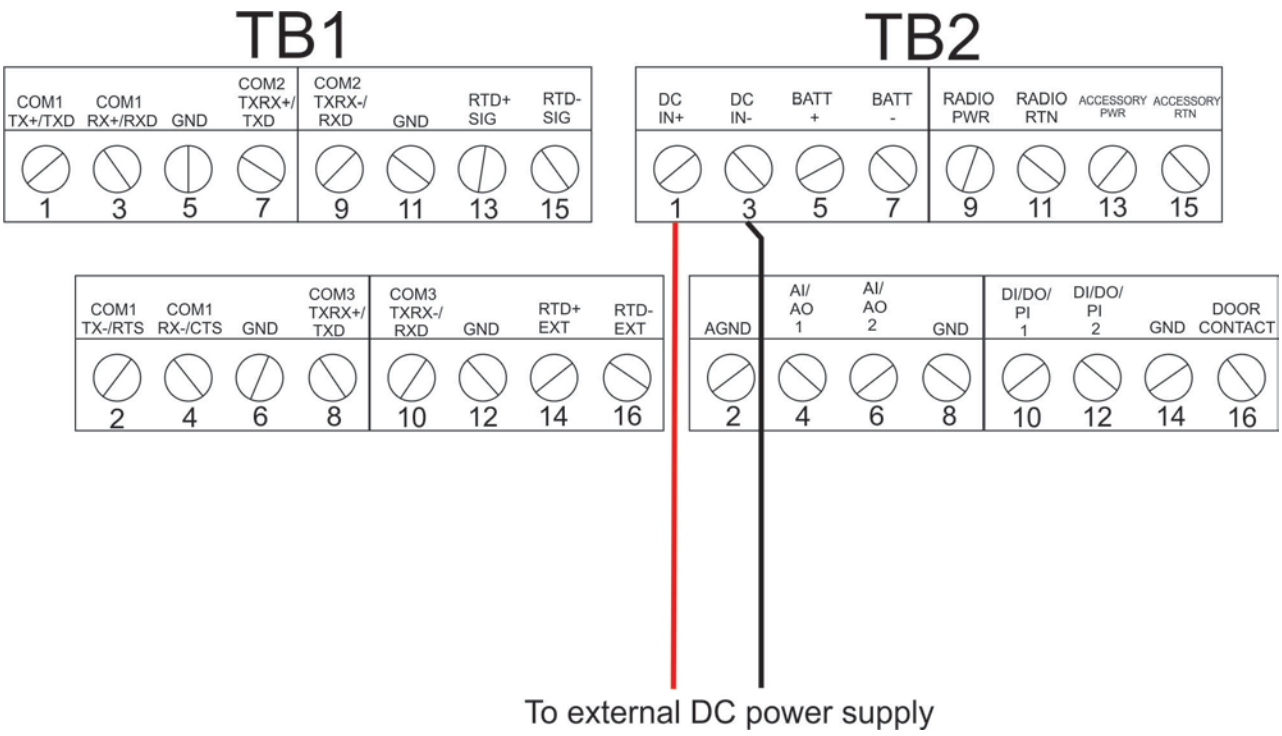
Power Wiring

⚠ DANGER

EXPLOSION HAZARD: Ensure the area in which you perform this operation is non-hazardous. Performing this operation in a hazardous area could result in an explosion.

The flow computer accepts DC power with an input voltage range from 10.5 to 30V. The amount of power required depends on installed options.

- DC Power:

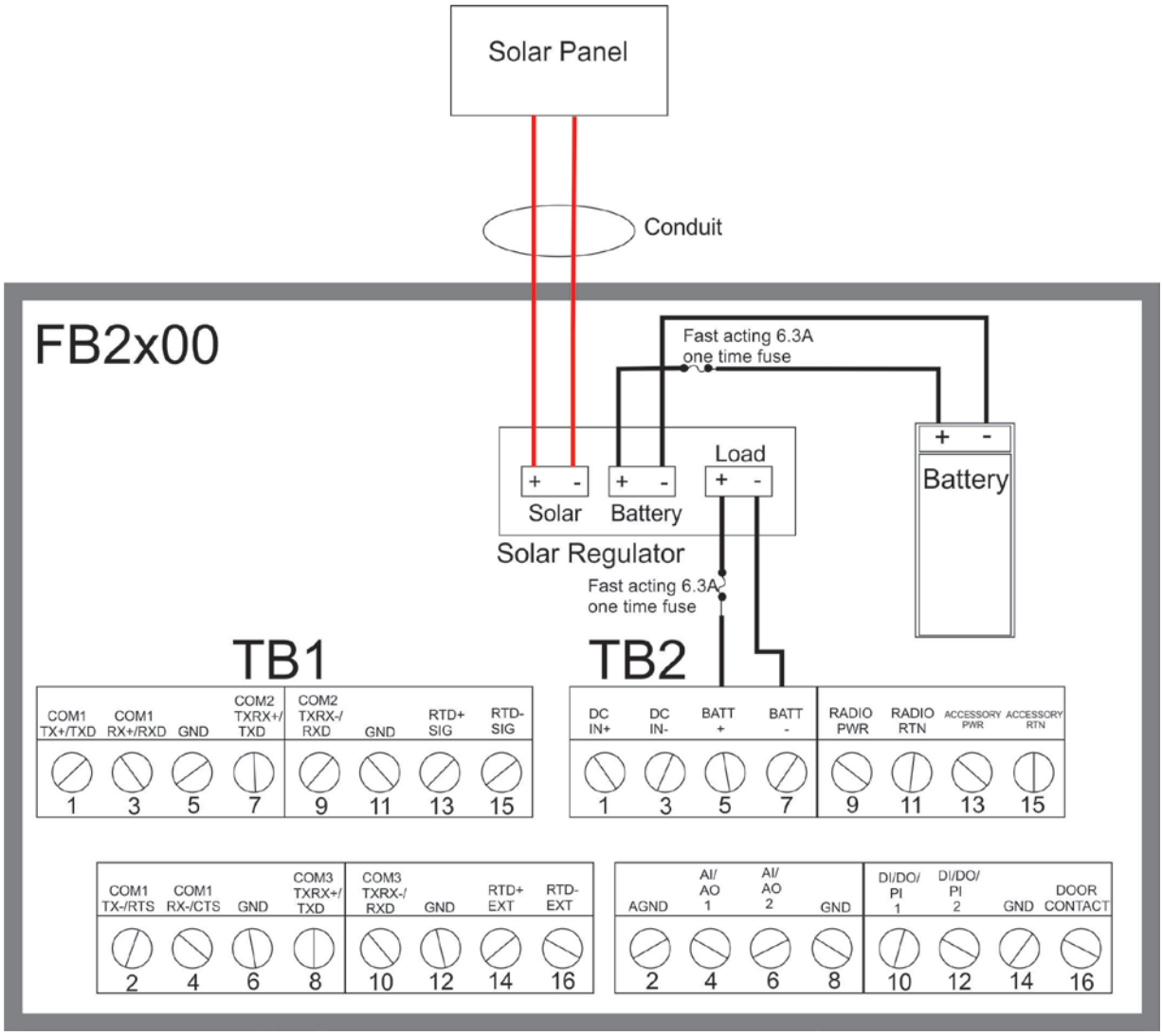


Important

If your installation uses DC power for main power, do not wire battery power as a secondary or "back up" power source. Certification only allows a single main power source; wiring both sources will void your certification.

- Solar Power (Internal Regulator):

  For the solar panel option using a solar regulator built into the flow computer enclosure, connect the pre-wired cable to the solar panel.



- Solar Power (External Solar Regulator):

For the 30W solar panel option with an external solar regulator (charger/controller) purchased through Emerson (Emerson-approved option) connect the external solar regulator to the flow computer battery using the instructions in this section.

If you are using your own external solar regulator/30W solar panel not purchased through Emerson, you can use this section as an example of a typical installation. You should also consult the manufacturer's instructions for your solar panel/solar regulator.

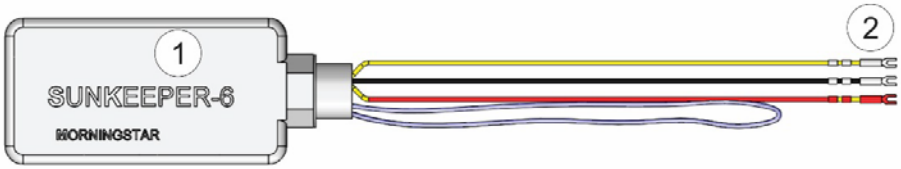
In either situation, you must use the battery, cables, and fuses supplied by Emerson for your connections to the solar regulator/solar panel.

Note

When making connections to the junction box or the solar regulator, you will need a suitable cable gland/grommet to prevent water ingress to the junction box.

1. If you're using a new solar regulator from Emerson, it comes with plastic mounting feet used only for surface mounting applications. Remove the mounting feet, but save the lock nut.
2. The solar regulator also comes with fork connectors.

External Regulator for 30W Solar Panel

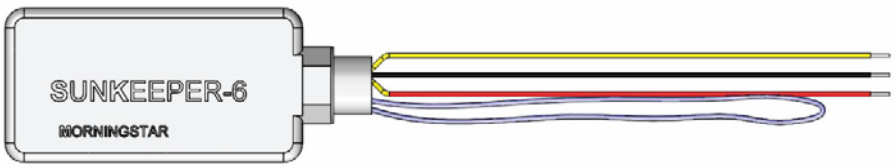


1 Solar regulator

2 Fork connectors

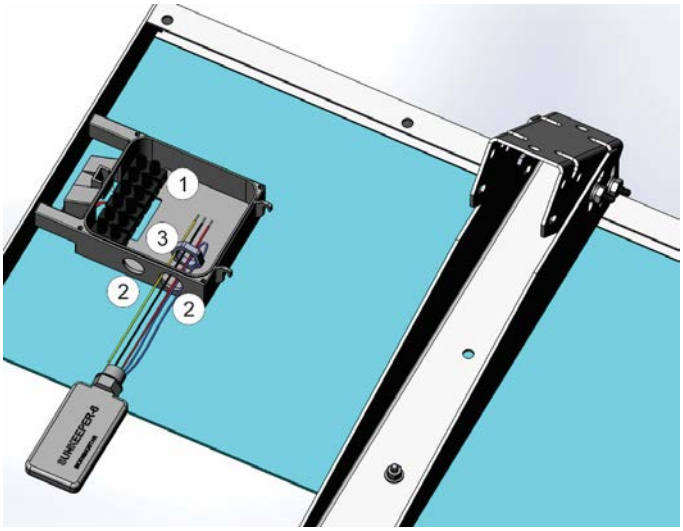
3. Remove the fork connectors and trim back the insulation on the wires ¼ inch.

External Regulator for 30W Solar Panel with fork connectors removed



4. Remove the junction box cover. Use a utility knife to remove the knock-outs (Item 2) in the junction box (Item 1) and feed the wires from the solar regulator into the junction box, and through the solar regulator lock nut (Item 3).

Wiring External Solar Regulator to 30W Solar Panel



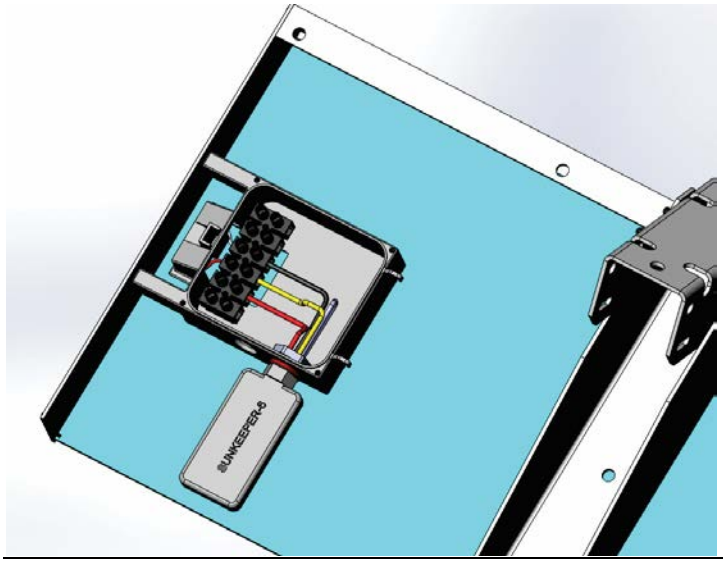
1 Junction box

2 Knock-out holes

3 Lock nut

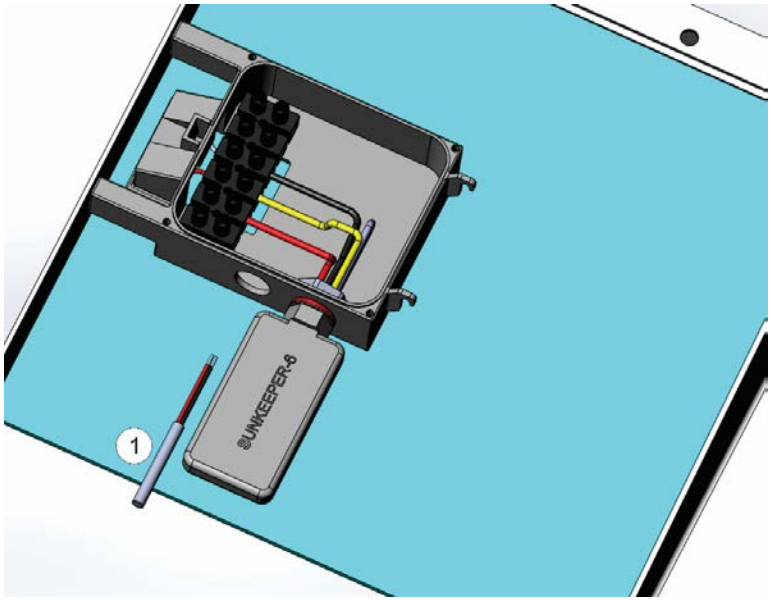
5. Use the solar regulator lock nut to attach the solar regulator to the junction box, and a 7/32” flat head screwdriver to attach the wires from the regulator to the junction box connectors as shown.

Wiring External Solar Regulator to 30W Solar Panel



6. Route the BATT+ and BATT- wires from the flow computer into the junction box.

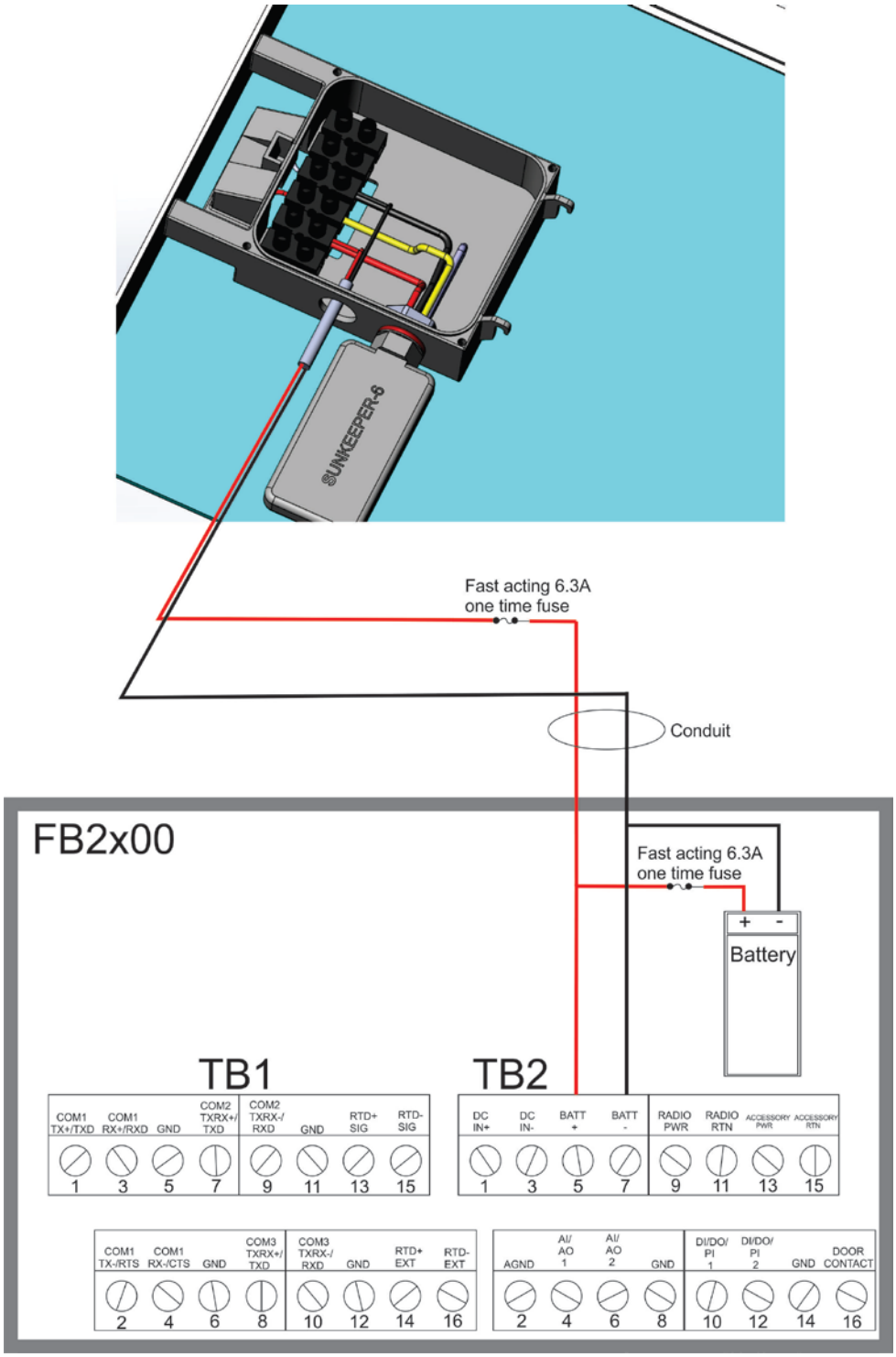
Battery Wires from the Flow Computer to 30W Solar Panel



1 Battery wires from the flow computer

7. Connect the wires as shown. Replace the junction box cover.

Connections from Flow Computer Battery to 30W Solar Panel



Installing the Main Battery Pack

⚠ DANGER

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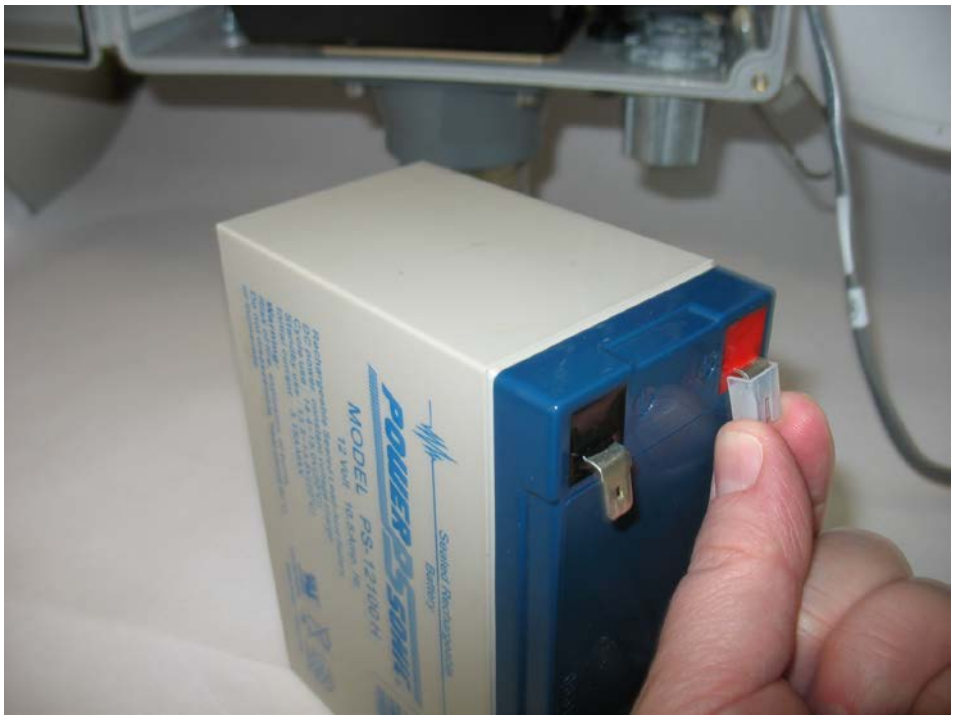
If you purchased one of the battery/solar panel options, note that the device ships with the battery pack uninstalled. You need to install the main battery pack before you place the device in service.

The device provides a battery cable with two pairs of battery connectors, enabling you to hot-swap the battery pack in a non-hazardous location.

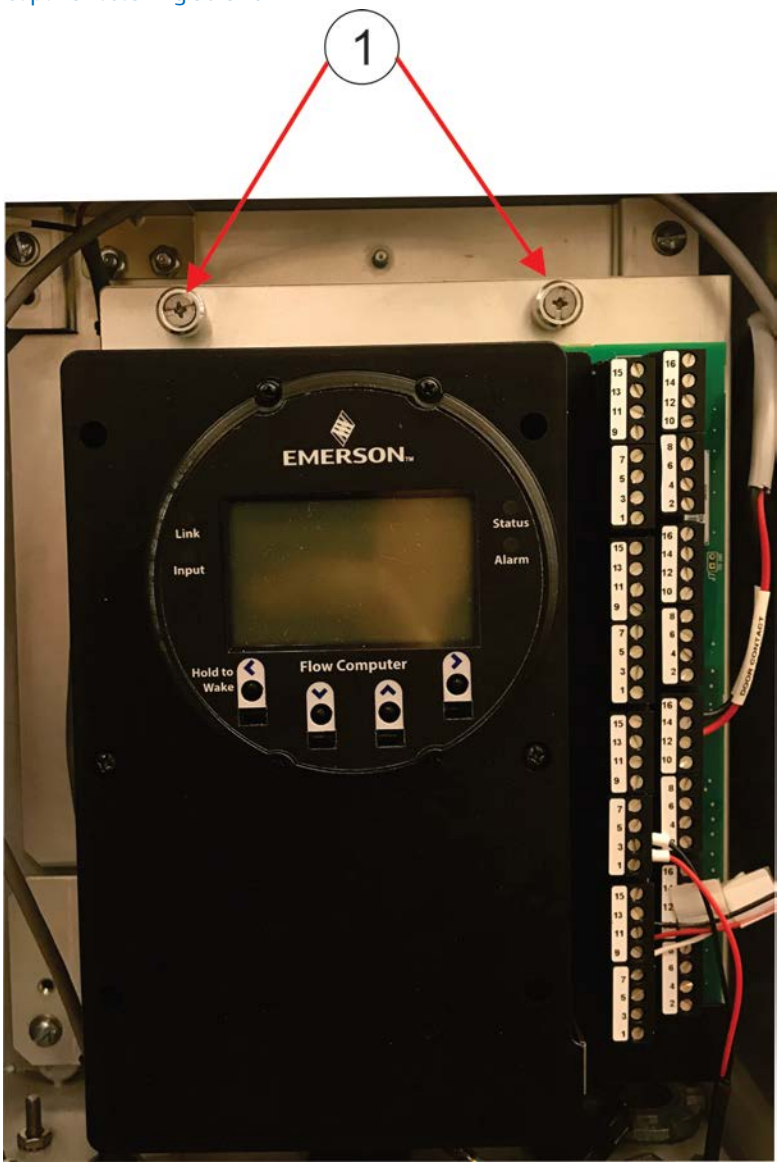
1. Remove the battery pack from its packaging.
2. Remove the plastic tabs covering the connectors on the battery pack.

Removing Plastic Tabs from Battery Pack



3. Open the enclosure.

Captive Fastening Screws



1 Captive fastening screws

4. Loosen the two captive fastening screws at the top of the battery compartment and carefully rotate the electronics assembly towards you to reveal the inside of the battery compartment. A strap prevents the front of the compartment from rotating too far forward.

Rotate Assembly Forward

5. The battery cable inside the battery compartment is divided into two branches, each with its own pair of connectors. Take either pair of connectors and connect them to the battery; the red (positive) wire connector attaches to the red connection point on the battery and the black (negative) wire connector attaches to the black connection point on the battery.

Battery Connections

6. Now you must secure the battery in the battery compartment so that it doesn't move around. How you do this depends on which battery compartment configuration you have. If the battery compartment includes a strap for holding the battery, see *Securing the Battery with a Strap*; if the battery compartment includes a hook-and-loop pad, see *Securing the Battery to the Pad*.

Securing the Battery with a Strap

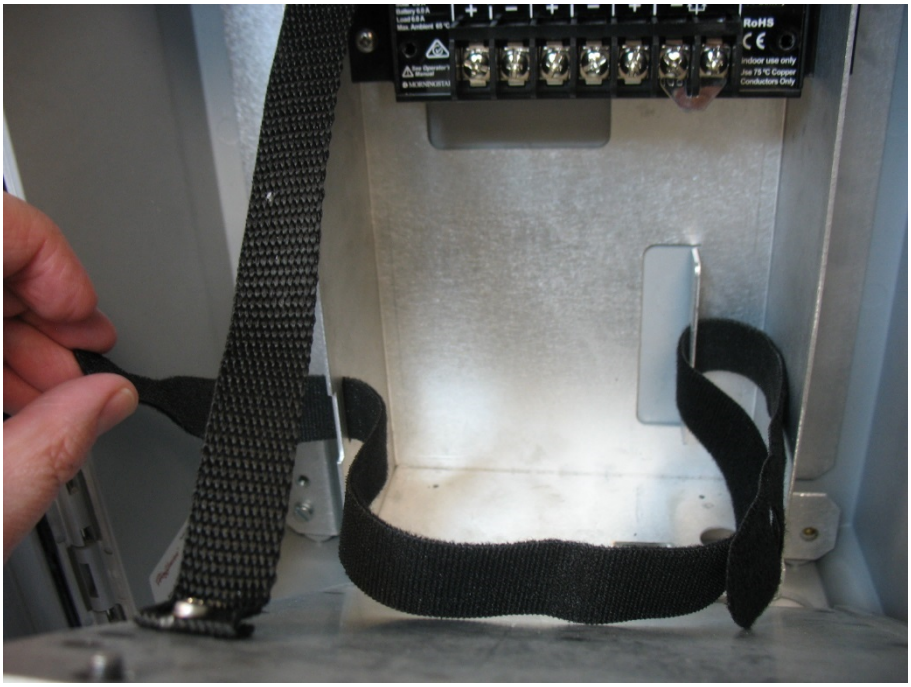
This type of battery compartment allows for certain accessories to be installed such as a relay or internal solar regulator.

1. If you have an internal solar regulator installed in the battery compartment, you must remove its termination cover in order to fit the battery inside. Remove the two screws (left and right) that fasten the termination cover to the solar regulator, and then set the termination cover aside. (If you don't have an internal solar regulator, skip to Step 2.)

Removing Termination Cover of Internal Solar Regulator

2. The battery strap must already be threaded through the holes of the battery compartment.

Battery Strap



1. Pick up the battery and carefully ease it into the battery compartment with the writing on the battery facing out and the connectors on the upper right-hand side. Nothing (including the strap) can be behind the battery.

Easing Battery Pack into Compartment

2. Carefully push the battery under the solar regulator (if present) and against the back of the compartment, now strap it in tightly by pulling the ends of the strap.

Battery Pack Attached to Compartment

3. The strap includes a narrow opening into which you can slide the other end of the strap to help you tighten it.

Battery Pack Attached to Compartment

4. Route the extra portion of the strap as well as the wires of the free portion of the battery cable so that they sit in an open area of the battery compartment.
5. If you had to remove the termination cover of an internal solar regulator (Step 1), re-attach the termination cover.

6. Rotate the electronics assembly up against the battery compartment and tighten the captive fastening screws with a torque value of 2 to 4 in-lbs. (0.2 to 0.5 N m) to close the compartment.

Securing the Battery to the Pad

For this type of battery compartment, a hook-and-loop pad on the back of the battery secures it to the back of the battery compartment.

1. Pick up the battery and align it with the lower left edge of the battery compartment. Press it against the back of the compartment so the pad on the back of the battery secures to the back of the battery compartment.

Figure 2-30: Battery Pack Attached to Compartment

2. Route the wires of the free portion of the battery cable so that they sit completely inside the open area at the top of the battery compartment.
3. Rotate the electronics assembly up against the battery compartment and with a torque value of 2 to 4 in-lbs (0.2 to 0.5 N m) to close the compartment.
4. Close the enclosure.

Powering Up/Powering Down the Flow Computer

⚠ DANGER

Do not attempt to connect power or disconnect power from the unit in a hazardous area. Ensure the area is non-hazardous. Failure to do so could result in an explosion.

1. Open the enclosure door.
2. Terminal block TB2 (pins 1,3,5,7) includes connections for DC power (DCIN+, DCIN-) and battery/solar power (BATT+, BATT-). The internal battery (which is also used with solar power) has its own internal connection.
   - Plug in TB2 (pins 1,3,5,7) to activate DC or battery/solar power. If your device uses an internal battery and it is not connected, connect it as discussed in *Connecting the Main Battery Pack*.
   - Unplug TB2 (pins 1,3,5,7) to deactivate DC or battery/solar power.

This turns on (or turns off) power from an external power supply or from the battery pack/solar panel.

Note

When you turn power on, the backlight on the HMI module lights, momentarily turns off and then remains lit while the INPUT LED blinks. After approximately one minute the initialization process finishes and the HMI starts to display live data.

Install Field Tools Configuration Software

You install Field Tools software (which includes FBxConnect) on your PC to configure the device.

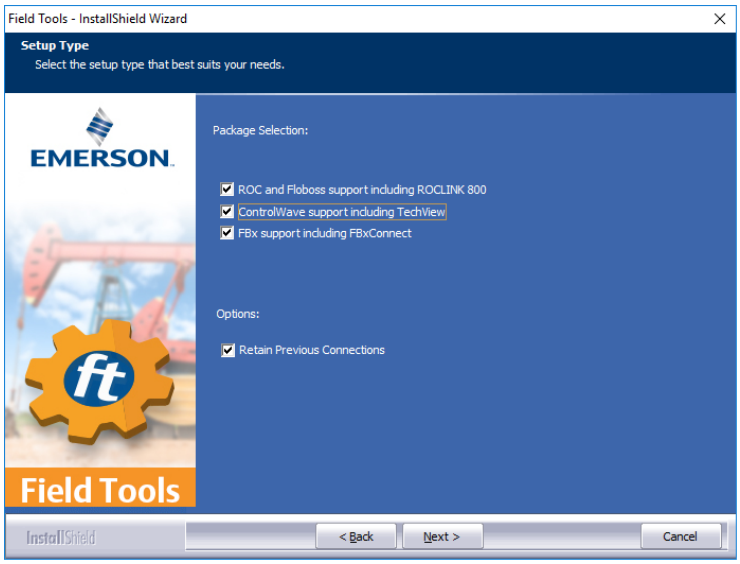
Important

- Field Tools (including FBxConnect) is available as a free software download to registered SupportNet users. If you are not a registered SupportNet user, new accounts take up to 24 hours to process so plan accordingly.
- AMS Device Configurator (available separately) is incompatible with AMS Device Manager: they cannot reside on the same machine.
- Before beginning the installation, close all other applications.
- Field Tools cannot reside on a computer running any component of OpenEnterprise 2.x, OpenEnterprise 3.x, OpenEnterprise Client/Server, or ObjectServer software.
- TechView and other components of BSI_Config software cannot be installed on a computer running OpenBSI Network Edition versions older than 5.9 Service Pack 2.
- You must have administrative privileges to install Field Tools.
- You must disable User Account Control (UAC) prior to installing Field Tools (you can re-enable it after a successful installation).
- As part of the installation, software from both Eltima and MACTek® is automatically installed. Depending upon your permissions, Windows may require you to confirm these installations before the installation can proceed.

1. Right click on the installer file, and choose Run as administrator from the pop-up menu. For details on minimum hardware/software requirements as well as more details on the installation steps see the *Field Tools Quick Start Guide* (D301703X412).

   Note

   During Field Tools installation, you must select the FBx support including FBxConnect option.



2. After software installation re-boot, start Field Tools from either the Windows Start Programs menu or (if you created it) from the desktop icon.

3. Log onto Field Tools.

Important

The very first time you login with Field Tools, use the default username of admin and leave the password field blank. Then assign a new password when prompted. See the *Field Tools Quick Start Guide* for any questions you have on changing default passwords after installation.

Establish a Connection and Launch the Setup Wizard

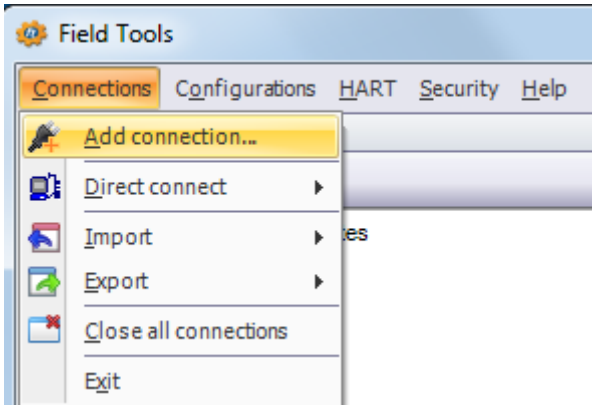
⚠CAUTION

When making multiple FBxConnect connections to the same device (as with a remote and a local connection), be aware that the changes one connection makes to the device may not be immediately visible to other connections, and may even require the other connections to restart FBxConnect before changes become visible. For example, simple changes (such as changes to setpoints) may be immediately visible to all connections, but changing the number of meters, configuring I/O, adding/deleting menu items, or other major configuration changes may require re-establishing the connection using FBxConnect.

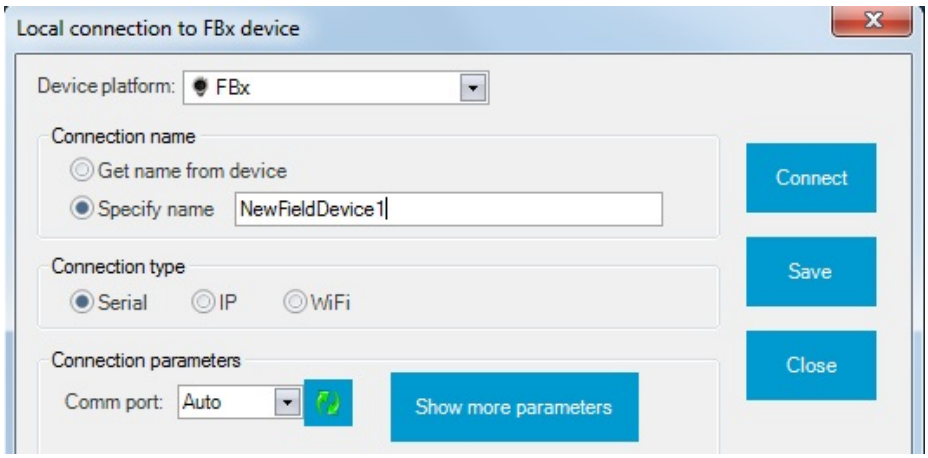
After you start Field Tools you connect to the device and launch the initial setup wizard.

- For a serial connection, connect a serial cable between either COM1 or COM2 on the device and a serial port (or USB/serial adapter) on your PC.
- WiFi® connections are possible if you purchased the Mobile SCADA option and if your PC supports wireless communication.
- For Ethernet connections (if you purchased the unit with Ethernet enabled), connect a standard 10/100Base-T Category 5 shielded Ethernet patch cable to the Ethernet port.

1. Click Connections > Add connection.

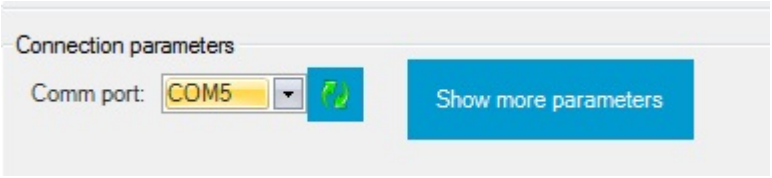


2. Choose FBx as the Device Platform.



3. Choose a Connection Type

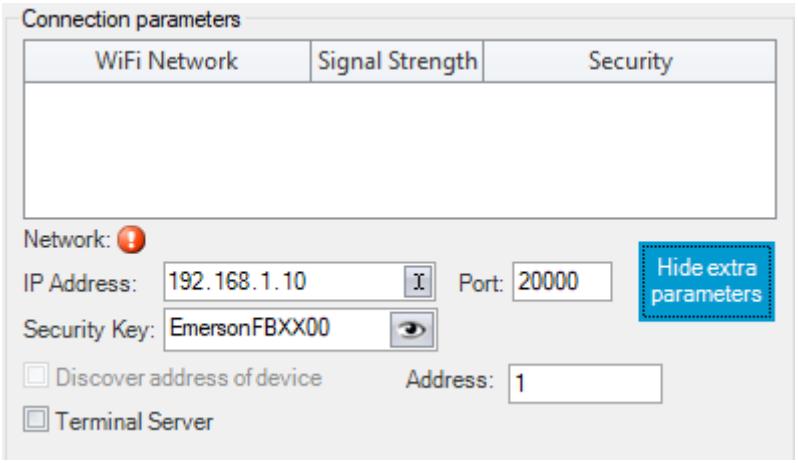
   - For serial: choose the PC Comm port (or the port for the USB/serial adapter).



   - For WiFi: choose the default WiFi Network. The format for the WiFi Network (SSID) is similar to WiFi Network:*FBxxxx_serialnumber*. Then you must enter the default Security Key: EmersonFBXX00. The flow computer's default IP Address for WiFi is 192.168.1.10.

Important

You must change the Security Key for your network to something that is different from the default or else anyone reading this document will know your key. If you connected via IP, you must assign a unique IP address to each device.



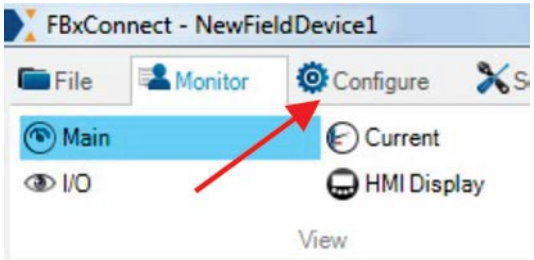
- For **IP:** Enter the default IP Address for the Ethernet port of **192.168.1.10**. (Your PC must be able to access this address.)

4. Click Connect. Field Tools activates the connection and automatically launches the FBxConnect tool.

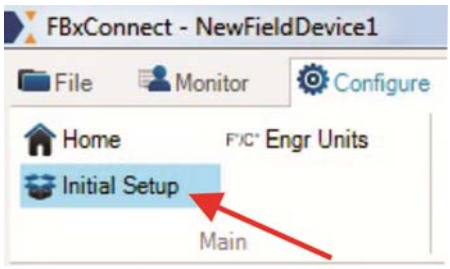
5. When prompted, enter admin for both the Username and Password.

> **Important**
> When you finish initial configuration activities, be sure you change the password for the admin user. Otherwise, anyone reading this document could gain access to your device.

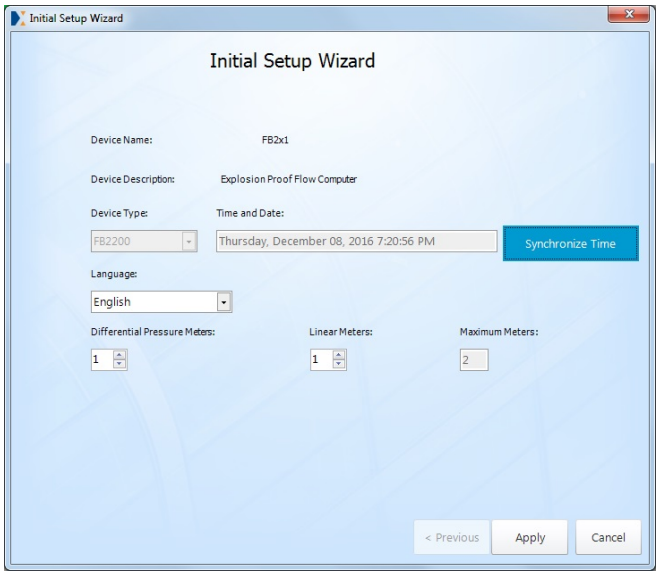
6. When FBxConnect opens, click Configure.



7. Click **Initial Setup** to launch the setup wizard.



8. Follow the on-screen instructions to configure the device. Click **Next** (or **Apply)** to proceed through pages of the wizard or click **Previous** to return to a previous page. When you are done, click **Finish**.



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